REMARKS

Claims 1-4 are pending in the present application. Claims 1-4 have been amended to clarify the invention that is claimed, as well as to correct obvious typographical errors. None of the amendments to the claims is intended to narrow the scope of the claims. No new matter has been added by the amendments to the claims.

The drawings have been objected to under 37 C.F.R. § 1.83(a) because "the subject matter of 'performing an additional ion-implantation process onto the exposed substrate surface' must be shown or the feature(s) canceled from the claim(s)." Applicant respectfully submits that the objections to the drawings have been mooted in view of the amendments to the claims, which remove the limitation of "performing an additional ion-implantation process onto the exposed substrate surface" from the claims. Accordingly, applicant respectfully requests that the objections to the drawings be withdrawn.

The disclosure has been objected to because of informalities. Applicant has amended the disclosure to overcome the examiner's objections. Specifically, applicant has replaced each reference to "①" in the disclosure with the descriptive text: --the numerical symbol "1" enclosed in a circle--. Similarly, applicant has replaced each reference to "②" in the disclosure with the descriptive text: --the numerical symbol "2" enclosed in a circle--.

Additionally, the Office action asserts at page 2, paragraph 2, that the term "after" on page 7, line 26 of the specification should be replaced with the term --before-- in view of Fig. 2D. This assertion is incorrect. As set forth on page 7, lines 25-27 of the specification, as originally filed, the photosensitive pattern 14 is removed after the additional boron ion-implantation process is completed. Accordingly, applicant respectfully submits that Fig. 2D is a cross-sectional view showing an image sensor after the second or additional boron ion-implantation process is performed and, therefore, no correction to the specification is necessary.

Furthermore, applicant has amended the title and certain paragraphs of the specification for grammatical reasons, to correct obvious typographical errors, and to improve readability. No new matter has been added by any of the amendments to the title and specification. Accordingly, applicant respectfully requests that all of the objections to the disclosure be withdrawn.

Lastly, claims 1-4 have been objected to because of alleged informalities and/or defects. Applicant has amended claims 1 and 2 in accordance with the examiner's suggestions and to clarify the invention that is claimed. No new matter has been added thereby. Accordingly, applicant respectfully requests that the objections to claims 1-4 be withdrawn.

Claim Rejections under 35 U.S.C. §§ 112 and 103(a)

Claims 1-4 have been rejected under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the written description requirement. Applicant has amended claims 1-4 to overcome the rejections. Specifically, claim 1 has been amended to recite, *inter alia*, performing a thermal oxidation process to form the field insulation layer on the exposed surface of the substrate, and forming a second ion-implantation region by performing a second ion-implantation process on the field insulation layer using the remaining pad nitride layer that exists after removal of the second portion of the pad nitride layer as a second mask. Accordingly, applicant respectfully requests that the rejections of claim 1-4 under 35 U.S.C. § 112, first paragraph, be withdrawn.

Claims 1-4 have also been rejected under 35 U.S.C. § 112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant respectfully traverses the rejections of claims 1-4 under 35 U.S.C. § 112, second paragraph, and requests reconsideration.

Applicant has amended claims 1-4 to overcome the rejections to the claims under 35 U.S.C. § 112, second paragraph. Specifically, in response to paragraph 7 of the Office action, applicant has amended claim 1 to recite, *inter alia*, forming a first ion-implantation region by performing a first ion-implantation process on the exposed surface of the substrate using the remaining pad nitride layer that exists after removal of the first portion of the pad nitride layer as a first mask, and performing a thermal oxidation process to form the field insulation layer on the exposed surface of the substrate.

In response to paragraph 8 of the Office action, applicant has amended claims 3 and 4 to recite, *inter alia*, at least one of the first ion-implantation process and the second ion-implantation process. Lastly, in response to paragraph 9 of the Office action, applicant has removed the recitation of a "photodiode" from claims 1-4 even though applicant disagrees

that the claims, as originally filed, "omitted essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections." Accordingly, applicant respectfully requests that the rejections of claim 1-4 under 35 U.S.C. § 112, second paragraph, be withdrawn.

Claims 1-4 have been further rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over U.S. Patent No. 6,351,002 ("Pan") in view of Japanese patent publication JP 5-283404 ("Ida") and/or U.S. Patent No. 5,128,274 ("Yabu et al."). Applicant respectfully traverses the rejections of claims 1-4. Reconsideration and withdrawal of the rejections are respectfully requested.

None of Pan, Ida, and Yabu et al. discloses or suggests the claimed combination of elements recited by each of claims 1-4. Claims 1-4 recite a method for isolating a hybrid device in an image sensor, the method comprising: forming sequentially a pad oxide layer and a pad nitride layer on a substrate and selectively removing a portion of the pad oxide layer and a first portion of the pad nitride layer to expose a surface of the substrate on which a field insulation layer will be formed; forming a first ion-implantation region by performing a first ion-implantation process on the exposed surface of the substrate using the remaining pad nitride layer that exists after removal of the first portion of the pad nitride layer as a first mask; performing a thermal oxidation process to form the field insulation layer on the exposed surface of the substrate; removing a second portion of the pad nitride layer so that a side of the remaining pad nitride layer that exists after removal of the second portion of the pad nitride layer is spaced apart from an edge of the field insulation layer by a distance; and forming a second ion-implantation region by performing a second ion-implantation process on the field insulation layer using the remaining pad nitride layer that exists after removal of the second portion of the pad nitride layer as a second mask.

Moreover, none of the cited references discloses or suggests an incentive for or a desirability of reducing the generation of dark current at the edges of the field insulation layer in a micronized structure by performing the method recited by the claims, namely, forming a first ion-implantation region and a second ion-implantation region that is spaced apart from an edge of the field insulation layer. As set forth in the specification, the second ion-implantation region is useful for improving dark current characteristics at the edges of the field oxide layer even in a micronized structure. The cited references do not even recognize

this problem, much less disclose or suggest an incentive for or desirability of solving this problem by performing the method recited by each of the pending claims.

For the reasons indicated above, applicant respectfully submits that none of Pan, Ida, and Yabu et al, whether taken individually or in combination, discloses, teaches, or suggests the claimed combination of elements recited by claim 1. Accordingly, claim 1 is neither anticipated by nor rendered obvious by any of the cited references. Because claim 1 is allowable, claims 2-4, dependent directly or indirectly on claim 1, are allowable for at least these same reasons.

In view of the foregoing, applicant submits the application as a whole is in condition for allowance, and such action is requested at the examiner's earliest convenience. The examiner is invited to contact applicant's undersigned attorney with any questions or comments regarding this amendment, or the application as a whole.

OTHER ISSUES

Applicant submits herewith a Supplemental Information Disclosure Statement and accompanying Form PTO-1449 citing an English translation of the Ida reference.

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APPLICANT'S INTERVIEW SUMMARY RECORD

In a telephonic interview with Examiner Shouxiang Hu on March 15, 2004, Examiner Hu advised the undersigned that he would be willing to allow the application if the undersigned would agree to a proposed examiner's amendment that corrected some alleged 35 U.S.C. § 112-type problems with the claims. Additionally, Examiner Hu advised the undersigned that the proposed examiner's amendment would render the claims allowable over U.S. Patent No. 5,128,274. Applicant respectfully thanks Examiner Hu for the suggested claim amendments, and has taken his comments and suggestions into consideration in preparing this Amendment.

Respectfully submitted for,
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